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EXAMINER	
BAREFORD, KATHERINE A	
ART UNIT	**PAPER NUMBER**
1762	

DATE MAILED: 02/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/733,740	PHILIP ET AL.	
	Examiner	Art Unit	
	Katherine A. Bareford	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23,25 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claim 24 is canceled

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment of Jan. 24, 2006 (filed in response to the Notice of Non-Compliant Amendment of Jan. 5, 2006) has been received and entered. Claim 24 has been canceled. Claims 1-23 and 25-26 (including new claims 25 and 26) are now pending for examination.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-4, 6-12, 22, 23, 25 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1, line 3 and new claims 25 and 26 require that the composite powder comprise "an unbound homogeneous mixture" of the listed constituents. Applicant refers to page 4, lines 7-9 as providing basis for this amendment. The Examiner has reviewed the disclosure as originally filed, including page 4, lines 7-9, but does not find support for the mixture in the powder being "unbound". While page 4, lines 7-9

provides that the constituents are mixture~~d~~ together to form a homogenous mixture prior to spraying, there is no teaching or suggestion that the composite powder is "unbound". The Examiner understands unbound to mean "not held in chemical or physical combination" (as defined in Webster's Ninth New Collegiate Dictionary, Merriam-Webster, Inc. (publishers), 1990). Here the constituents must be in at least physical combination since a "composite powder" is required. As a result, the claims contain new matter.

Claims 2-4, 6-12, 22 and 23 do not cure the defects of the claims from which they depend.

Claims

4. The Examiner understands the term "low velocity oxygen fuel process" to mean a combustion powder thermal spray process or powder flame spray process, as described in the cited "Combustion Powder Thermal Spray Process (Flame Spray Process)" document.

At pages 6-7 of the Jan. 24, 2006 amendment, applicant states that

> "The Examiner correctly asserts that Longo teaches that its particles can be applied by conventional powder-type flame spray equipment , and the Examiner then parenthetically notes that this reads on Applicants claimed low velocity oxygen fuel process (to which Applicants respectfully disagree). While Longo does teach that conventional powder-type flame spray equipment can be used, such conventional spray equipment taught by Longo is unsuitable for Applicants claimed spray process (see e.g. p. 2 lines 16-20) which requires the claimed low velocity oxygen fuel process used with the particularly claimed powder mixture, as explained in Applicants specification. See e.g. p. 4 lines 17-30, p. 4 lines 1-16.

> Applicants also note that the Examiner indicated that the term "low velocity oxygen process" to mean a combustion powder thermal Spray process or powder flame spray process as described in the cited "Combustion Powder Thermal Spray Process (Flame Spray Process) document; Applicants respectfully submit that the term "low velocity oxygen fuel process" is properly construed by the specification in view of what those skilled in the art would understand."

Applicant states that the conventional spray equipment taught by Longo is unsuitable for applicants claimed spray process. However, the Examiner remains of the position that conventional powder-type flame spray equipment is encompassed by the term "Low Velocity Oxygen Fuel Process". The specification provides no description of what precisely is required by such a process, so the Examiner must base her understanding of the term on what in conventional in the art, which as described in the cited "Combustion Powder Thermal Spray Process (Flame Spray Process)" document equates the combustion powder thermal spray process (flame spray process) and low velocity oxygen fuel processes.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the

various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. The rejection of claims 1, 6-7 and 23 under 35 U.S.C. 103(a) as being unpatentable over Longo et al (US 4450184) (hereinafter Longo '184) is withdrawn due to the amendment to the claims as to the unbounded powder of Jan. 24, 2006.

8. The rejection of claims 2-3 and 8-10 under 35 U.S.C. 103(a) as being unpatentable over Longo '184 as applied to claims 1, 6-7 and 23 above, and further in view of Japan 2002-275615 (hereinafter '615) is withdrawn due to the amendment to the claims as to the unbounded powder of Jan. 24, 2006.

9. The rejection of claims 4 and 11-12 under 35 U.S.C. 103(a) as being unpatentable over Longo '184 as applied to claims 1, 6-7 and 23 above, and further in view of Spitsberg et al (US 2003/0027012) is withdrawn due to the amendment to the claims as to the unbounded powder of Jan. 24, 2006..

10. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Longo et al (US 44501184) (hereinafter Longo '184) in view of Nagaraj et al (US 2005/0191516) (hereinafter Nagaraj '516).

Longo '184 teaches a method of applying a zirconia (zirconium oxide) based thermal barrier coating. Column 1, lines 40-50, column 2, lines 25-50 and column 3, lines 5-20. The applied coating can be porous. Column 1, lines 40-50, column 4, lines 55-60, and column 5, lines 5-10. The method includes selecting a composite powder comprising a first constituent that can comprise stabilized zirconia particles. Column 2, lines 25-50, column 3, lines 5-20 and column 4, lines 60-68 (stabilized zirconia can be used). The powder also can have a second constituent that can comprise a second ceramic material, such as titanium oxide or cerium oxide. Column 3, lines 5-20 and column 4, lines 60-68 (note that combinations of the listed materials can be used). (It would have been obvious to select materials from the lists provided by Longo '184 with an expectation of desirable coating results, as the selection of such materials is taught by Longo '184). The second ceramic material can have a melting temperature sufficiently low so that the second constituent particles can at least partially melt when applied. Column 3, lines 5-20 and column 4, lines 60-68 (given the melting temperatures of cerium oxide (1950 degrees C) and titanium oxide (1640 degrees C) these particles would melt under conventional flame spraying conditions required to at least heat soften the zirconia, which is taught at column 1, lines 10-15). The particles can be applied by a conventional powder-type flame spray equipment (a low velocity oxygen

fuel process/LVOF). Column 2, lines 45-50 and column 1, lines 5-40. The spray powder can also be a mixture of particles used in thermal spraying. Column 5, lines 15-25.

Longo '184 teaches all the features of this claim except that the LVOF process melts the titanium/cerium oxide particles and repair of the component while in the machine.

However, Nagaraj '516 teaches that it is well known to need to repair a zirconia based thermal barrier coating. Paragraphs [0025] and [0032]. Access to a damaged region of a coating on a component in a machine is provided. Paragraphs [0032] (the part can be in an assembled state) and [0037]. The damaged region is cleaned. Paragraph [0037] (note the treatment with water, etc.) Then, a thermal spraying process, plasma spraying, is used to apply repair material to the damaged region without removing the component from the machine. Paragraphs [0032], [0039], [0040].

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '184 to at least partially melt the titanium/cerium oxide particles when spraying with powder flame spraying in order to provide a desirably dense and bonded coating, because Longo '184 teaches that conventional flame spray processes at least heat softens the coating material when spraying, and given the melting temperatures of cerium oxide (1950 degrees C) and titanium oxide (1640 degrees C) these particles would melt under conventional flame spraying conditions required to at least heat soften the zirconia. It would further have been obvious to one of ordinary skill in the art at the time the invention was made to

modify Longo '184 to use the process for on machine repair as suggested by Nagaraj '516, in order to provide a desirable repaired barrier layer, because Longo '184 teaches to provide a thermal barrier layer using stabilized zirconia and other ceramic particles and that multiple materials can be present, and Nagaraj '516 teaches the thermal spraying to provide repaired thermal barrier coatings without disassembling. It would further have been obvious to use flame spraying as well as plasma spraying to provide the thermal barrier coating, because while Nagaraj '516 teaches plasma spraying, Longo '184 teaches that the specific barrier coating of Longo '184 can be provided by either flame or plasma spraying with desirable coating results.

11. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Longo et al (US 3607343) (hereinafter Longo '343) in view of Nagaraj et al (US 2005/0191516) (hereinafter Nagaraj '516).

Longo '343 teaches a method of applying a zirconia (zirconium oxide) based thermal barrier coating. Column 3, line 60 through column 4, line 15. The method includes selecting a composite powder comprising a first constituent that can comprise stabilized zirconia particles. Column 1, lines 40-52 (see lines 49 and 51—stabilized or unstabilized zirconia can be used). The powder also has a second constituent that can comprise a second ceramic material, such as titanium oxide or manganese oxide. Column 2, lines 5-15, 40-50 and 65-75. The second ceramic material has a melting temperature sufficiently low so that the second constituent particles can at least

partially melt when applied. Column 1, lines 10-15, column 2, lines 40-50 and column 3, lines 50-55 (given the melting temperatures of manganese oxide (1705 degrees C) and titanium oxide (1640 degrees C) these particles would melt under conventional flame spraying conditions required to at least heat soften the zirconia). (It would have been obvious to select materials from the lists provided by Longo '343 with an expectation of desirable coating results, as the selection of such materials is taught by Longo '343).The particles can be applied by a conventional powder-type flame spray equipment (a low velocity oxygen fuel process/LVOF). Column 3, lines 50-55. The spray powder can also be a mixture of particles used in thermal spraying. Column 1, lines 70-75.

Claim 24: The coating can be nonporous. Column 3, lines 25-35.

Longo '343 teaches all the features of these claims except that the LVOF process melts the titanium/manganese oxide particles and repair of the component while in the machine.

However, Nagaraj '516 teaches that it is well known to need to repair a zirconia based thermal barrier coating. Paragraphs [0025] and [0032]. Access to a damaged region of a coating on a component in a machine is provided. Paragraphs [0032] (the part can be in an assembled state) and [0037]. The damaged region is cleaned. Paragraph [0037] (note the treatment with water, etc.) Then, a thermal spraying process, plasma spraying, is used to apply repair material to the damaged region without removing the component from the machine. Paragraphs [0032], [0039], [0040].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '343 to at least partially melt the titanium/manganese oxide particles when spraying with powder flame spraying in order to provide a desirably dense and bonded coating, because Longo '343 teaches that conventional flame spray processes at least heat softens the coating material when spraying, and given the melting temperatures of manganese oxide (1705 degrees C) and titanium oxide (1640 degrees C) these particles would melt under conventional flame spraying conditions required to at least heat soften the zirconia. It would further have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '343 to use the process for on machine repair as suggested by Nagaraj '516, in order to provide a desirable repaired barrier layer, because Longo '343 teaches to provide a thermal barrier layer using stabilized zirconia and other ceramic particles and that multiple materials can be present, and Nagaraj '516 teaches the thermal spraying to provide repaired thermal barrier coatings without disassembling. It would further have been obvious to use flame spraying as well as plasma spraying to provide the thermal barrier coating, because while Nagaraj '516 teaches plasma spraying, Longo '343 teaches that the specific barrier coating of Longo '343 can be provided by either flame or plasma spraying with desirable coating results.

12. Claims 14-15 and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Longo '184 in view of Nagaraj '516 or Longo '343 in view of Nagaraj '516 as

applied to claims 5 and 13, respectively, above, and further in view of Japan 2002-275615 (hereinafter '615).

Longo '184/'343 in view of Nagaraj '516 teaches all the features of these claims except (1) the calcium or strontium titanate (claims 14-15) and (2) the coefficient of thermal expansions (claims 17-19).

However, '615 teaches that a desirable material to be applied by thermal spraying to a substrate to form a thermal barrier coating is calcium titanate ($CaTiO_3$), which can be applied with yttria stabilized zirconia. See the abstract.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '184/'343 in view of Nagaraj '516 to use calcium titanate particles with the stabilized zirconia – titanium/manganese oxide particles as suggested by '615, in order to provide a desirable barrier layer, because Longo '184/'343 in view of Nagaraj '516 teaches to provide a thermal barrier layer using stabilized zirconia and particles that can be titanium oxide and that multiple materials can be present, and '615 teaches the desirability of using stabilized zirconia and to add a form of titanium oxide, calcium titanate, to form thermal barrier coatings. Given the temperature of spraying, the titanate would also partially melt. Furthermore, it would further have been obvious to modify Longo '184/'343 in view of Nagaraj '516 in view of '615 to use strontium titanate with an expectation of providing a desirable thermal barrier coating, because Longo '184/'343 in view of Nagaraj '516 and '615 indicate the desirability of using stabilized zirconia and titanium oxide materials when forming

thermal barrier coatings, and it is the Examiner's position that strontium titanate is a well known titanium oxide material. As a result of using the stabilized zirconia and specific titanium oxide materials, the claimed ranges of the coefficients of thermal expansion would be inherently provided as in claims 17-19.

13. Claims 16 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Longo '184 in view of Nagaraj '516 or Longo '343 in view of Nagaraj '516 as applied to claims 5 and 13, respectively, above, and further in view of Spitsberg et al (US 2003/0027012).

Longo '184/'343 in view of Nagaraj '516 teaches all the features of these claims except (1) the sodium-zirconium-phosphate-silicate (claim 16) and (2) the thermal conductivity (claims 20-21).

However, Spitsberg teaches that a desirable material to be applied by thermal spraying to a substrate to form a thermal barrier coating is zirconium phosphate materials (NZP-family materials), including sodium zirconate phosphate, which are applied with yttria stabilized zirconia (YSZ). Paragraphs [0022] and [0025].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '184/'343 in view of Nagaraj '516 to use NZP material particles with the stabilized zirconia – titanium/manganese oxide particles as suggested by Spitsberg, in order to provide a desirable barrier layer, because Longo '184/'343 in view of Nagaraj '516 teaches to provide a thermal barrier layer using

stabilized zirconia and other ceramic particles and that multiple materials can be present, and Spitsberg teaches the desirability of using stabilized zirconia and a form of NZP materials to form thermal barrier coatings. Given the temperature of spraying, the NZP materials would also at least partially melt. It would further have been obvious to modify Longo '184/'343 in view of Nagaraj '516 in view of Spitsberg to use sodium-zirconium-phosphate-silicate with an expectation of providing a desirable thermal barrier coating, because Longo '184/'343 in view of Nagaraj '516 and Spitsberg indicate the desirability of using stabilized zirconia and NZP materials, including those with sodium zirconate phosphate when forming thermal barrier coatings, and it is the Examiner's position that sodium-zirconium-phosphate-silicatis a well known NZP material. As a result of using the stabilized zirconia and NZP materials, the claimed ranges of the coefficients of thermal conductivity would be inherently provided as in claims 20-21.

Response to Arguments

14. Applicant's arguments filed Jan. 24, 2006 have been fully considered but they are not persuasive.

As to the remaining 35 USC 103 rejections as to claims 5 and 13-21, the Examiner has reviewed applicant's arguments, however, the rejection is maintained. As to the selection of the specifically claimed materials from the lists given by Longo '184 and Longo '343, it is the Examiner's position that it would have been obvious to one of

ordinary skill in the art to select materials from the list given by Longo '184 and Longo '343 with an expectation of desirable results as taught by those references. Applicant argues that they provide specific benefits to choosing the particular materials claimed by applicant. However, applicant has made no showing that unexpected benefits or criticality is shown as to the specific materials claimed as opposed to the other materials taught by Longo '184 and Longo '343. As to the use of the low velocity oxygen process, it remains the Examiner's position that the conventional powder type flame spray equipment taught by the two Longo references would be considered low velocity oxygen fuel processes to the extent claimed by applicant. Applicant has provided no indication that a different feature is needed. The obviousness of using the particular powder mixture claimed is provided by the materials suggested by the two Longo references as discussed above.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KATHERINE BAREFORD
PRIMARY EXAMINER